

We claim:

1 1. A method of controlling a space switch to establish time-varying connections, said
2 method comprising:

3 receiving a stream of burst transfer requests from a source node, each of said burst
4 transfer requests including parameters specifying a requested connection and a
5 duration for said requested connection;

6 generating scheduling information for each of said burst transfer requests based on
7 said parameters;

8 transmitting said scheduling information to said source node; and

9 transmitting instructions to a slave controller for said space switch, where said
10 instructions are based on said scheduling information and instruct said space switch to
11 establish said requested connection.

12 2. The method of claim 1 wherein said scheduling information includes an indication of a
time at which said space switch will be scheduled to establish said requested connection.

1 3. A space switch master controller comprising:

2 a source interface for:

3 receiving a stream of burst transfer requests from a source node, each of said
4 burst transfer request including parameters specifying a requested connection
5 and a duration for said requested connection;

6 transmitting scheduling information for each of said burst transfer requests to
7 said source node;

8 a burst scheduler for generating said scheduling information for each of said burst
9 transfer requests in said stream based on said parameters; and

10 a slave controller interface for transmitting instructions to a slave controller for said
11 space switch, where said instructions are based on said scheduling information and
12 instruct said space switch to establish said requested connection.

- 1 4. A computer readable medium containing computer-executable instructions which, when
2 performed by a processor in a space switch master controller, causes the processor to:
 - 3 receive a stream of burst transfer requests from a source node, each of said burst
4 transfer requests including parameters specifying a requested connection and a
5 duration for said requested connection;
 - 6 generate scheduling information for each of said burst transfer requests based on said
7 parameters;
 - 8 transmit said scheduling information to said source node; and
 - 9 transmit instructions to a slave controller for said space switch, where said
10 instructions are based on said scheduling information and instruct said space switch to
11 establish said requested connection.
- 1 5. A method of generating scheduling information comprising:
 - 2 determining a next-available input port among a plurality of input ports and a time
3 index at which said next-available input port will become available;
 - 4 for each burst transfer request of a plurality of burst transfer requests received in
5 relation to said next-available input port, and where each said each burst transfer
6 request includes an identity of a burst and a destination for said burst:
 - 7 determining, from said destination for said burst, a corresponding output port
8 among a plurality of output ports;
 - 9 determining a time gap, where said time gap is a difference between:
 - 10 said time index at which said next-available input port will become
11 available; and
 - 12 a time index at which said corresponding output port will become
13 available;

14 selecting one of said plurality of burst transfer requests as a selected burst transfer
15 request, where said selected burst transfer request has a minimum time gap of said
16 plurality of burst transfer requests;

17 selecting a scheduled time index, where said scheduled time index is one of said time
18 index at which said next-available input port is available and said time index at which
19 said corresponding output port is available; and

20 transmitting scheduling information for a burst identified by said selected burst
21 transfer request, said scheduling information based on said scheduled time index.

1 6. The method of claim 5 wherein said determining said next-available input port comprises
2 scanning a time calendar until an input port identifier is detected in a time slot, said calendar
3 having a plurality of time slots, where each time slot corresponds to a predefined time
4 interval.

1 7. The method of claim 6 wherein said determining said time gap comprises reading said
2 time index at which said corresponding output port is available from an element in an array,
3 where said element is associated with said corresponding output port.

1 8. The method of claim 7 further comprising:

2 determining, from said selected burst transfer request, a transfer-time for said burst;

3 adding said transfer-time to said scheduled time index to result in a finishing time
4 index; and

5 writing said input port identifier in a time slot corresponding to said finishing time
6 index.

1 9. The method of claim 8 further comprising writing a null identifier in a time slot
2 corresponding to said scheduled time index.

1 10. The method of claim 9 further comprising writing said finishing time index to said
2 element in said array.

1 11. The method of claim 10 wherein said array is one of a plurality of arrays and said writing
2 said finishing time index comprises writing said finishing time index to the element that is
3 associated with said corresponding output port in each of said plurality of arrays.

1 12. The method of claim 11 wherein said writing in each of said plurality of arrays is
2 performed in parallel.

1 13. The method of claim 10 wherein said time index at which said corresponding output port
2 is available is selected as said scheduled time index.

1 14. The method of claim 10 wherein a calendar time slot index at which said input port
2 identifier is detected is selected as said scheduled time index.

1 15. The method of claim 6 wherein said input port identifier is detected only if included in a
2 predetermined group of input port identifiers.

1 16. The method of claim 15 wherein burst transfer requests are organized by groups of output
2 ports and said determining said time gap is limited to include only those burst transfer
3 requests corresponding to a group of said plurality of output ports.

1 17. A burst scheduler comprising a processor operable to:

2 determine a next-available input port among a plurality of input ports and a time index
3 at which said next-available input port will become available;

4 for each burst transfer request of a plurality of burst transfer requests received in
5 relation to said next-available input port, and where each said each burst transfer
6 request includes an identity of a burst and a destination for said burst:

7 determine, from said destination for said burst, a corresponding output port
8 among a plurality of output ports;

9 determine a time gap, where said time gap is a difference between:

10 said time index at which said next-available input port will become
11 available; and

12 a time index at which said corresponding output port will become
13 available;

14 select one of said plurality of burst transfer requests as a selected burst transfer
15 request, where said selected burst transfer request has a minimum time gap of said
16 plurality of burst transfer requests;

17 select a scheduled time index, where said scheduled time index is one of said time
18 index at which said next-available input port is available and said time index at which
19 said corresponding output port is available; and

20 generate scheduling information for a burst identified by said selected burst transfer
21 request, said scheduling information based on said scheduled time index.

1 18. A computer readable medium containing computer-executable instructions which, when
2 performed by a processor in a burst scheduler, cause the processor to:

3 determine a next-available input port among a plurality of input ports and a time index
4 at which said next-available input port will become available;

5 for each burst transfer request of a plurality of burst transfer requests received in
6 relation to said next-available input port, and where each said each burst transfer
7 request includes an identity of a burst and a destination for said burst:

8 determine, from said destination for said burst, a corresponding output port
9 among a plurality of output ports;

10 determine a time gap, where said time gap is a difference between:

11 said time index at which said next-available input port will become
12 available; and

13 a time index at which said corresponding output port will become
14 available;

15 select one of said plurality of burst transfer requests as a selected burst transfer
16 request, where said selected burst transfer request has a minimum time gap of said
17 plurality of burst transfer requests;

18 select a scheduled time index, where said scheduled time index is one of said time
19 index at which said next-available input port is available and said time index at which
20 said corresponding output port is available; and

21 generate scheduling information for a burst identified by said selected burst transfer
22 request, said scheduling information based on said scheduled time index.

1 19. A core node in a data network comprising:

2 a space switch;

3 a plurality of input ports;

4 a plurality of output ports; and

5 a slave controller for said space switch for receiving instructions from a master
6 controller of said space switch, said instructions including specifications of temporary
7 connections to establish between said plurality of input ports and said plurality of
8 output ports and indications of timing with which to establish said connections.

9 20. The core node of claim 19 further comprising a master controller for said space switch,
2 for:

3 receiving a stream of burst transfer requests from a source node, each of said burst
4 transfer requests including parameters specifying a requested connection and a
5 duration for said requested connection;

6 generating scheduling information for each said burst transfer request based on said
7 parameters;

8 transmitting said scheduling information to said source node; and

9 transmitting said instructions to said slave controller for said space switch, where said
10 instructions are based on said scheduling information.

1 21. A data network comprising:

2 a plurality of edge nodes;

3 a plurality of core nodes, each core node of said plurality of core nodes including a
4 space switch; and

5 a master controller for one said space switch in one said core node for:

6 receiving a stream of burst transfer requests from one of said plurality of edge
7 nodes, each of said burst transfer requests including parameters specifying a
8 requested connection and a duration for said requested connection;

9 generating scheduling information for each of said burst transfer requests
10 based on said parameters;

11 transmitting said scheduling information to said one of said plurality of edge
12 nodes; and

13 transmitting said instructions to a slave controller for said one said space
14 switch, where said instructions are based on said scheduling information.